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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,132	01/27/2004	William A. Sirignano	703538.4032	1974
34313	7590	01/27/2006		
ORRICK, HERRINGTON & SUTCLIFFE, LLP IP PROSECUTION DEPARTMENT 4 PARK PLAZA SUITE 1600 IRVINE, CA 92614-2558			EXAMINER COCKS, JOSIAH C	
			ART UNIT	PAPER NUMBER
			3749	

DATE MAILED: 01/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/766,132	Applicant(s) SIRIGNANO ET AL.	
	Examiner Josiah Cocks	Art Unit 3749	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 15-17 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 15-17 and 19-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 December 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/7/2005 has been entered.

Terminal Disclaimer

2. The terminal disclaimer filed on 12/7/2005 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 6,877,978 has been reviewed and is NOT accepted.

The application/patent being disclaimed has been improperly identified since the number used to identify the patent being disclaimed is incorrect in the fifth line of the first paragraph of the terminal disclaimer (note the incorrect patent identified is 6,677,975). The correct number is 6,877,978. A corrected terminal disclaimer is required.

Drawings

3. The drawings filed on 12/7/2005 are not accepted by the examiner. These drawings fail to include a label of "Replacement Sheet" as required by 37 CFR 1.121 (d). Correction is required.

INFORMATION ON HOW TO EFFECT DRAWING CHANGES

Replacement Drawing Sheets

Drawing changes must be made by presenting replacement sheets which incorporate the desired changes and which comply with 37 CFR 1.84. An explanation of the changes made must be presented either in the drawing amendments section, or remarks, section of the amendment paper. **Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d).** A replacement sheet must include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of the amended drawing(s) must not be labeled as "amended." If the changes to the drawing figure(s) are not accepted by the examiner, applicant will be notified of any required corrective action in the next Office action. No further drawing submission will be required, unless applicant is notified.

Claim Rejections - 35 USC § 112

4. The 35 USC § 112 rejection identified in the prior Office action is withdrawn. Applicant has argued that the "means for" clause of claim 1 identifies among other things "a plurality of liquid fuel injectors, each coupled to one of the plurality of orifices and oriented tangentially to a wall of the chamber and orthogonally to the major flow direction" as claimed in claim 8 and/or a swirl generator as claimed in claim 10. Implicit in this argument is the assertion that the structure identified by the "means for" clause is distinct from the liquid-fuel inlet previously identified. This distinction is acknowledged.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-4, 6, 7, 10-12, 15, 16, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 2,918,118 to Schirmer ("Schirmer '118").

Schirmer '118 discloses in the specification and Figures 1-6 an invention in the same field of endeavor as applicant's invention and substantially as recited in applicant's claims 1-4, 6, 7, 10-12, 15, 16, and 19-21 with the exception of the lateral dimension of the chamber being sub-centimeter, and more particularly in the range of 1.0 to 3.0 millimeters, and the length being in the range of 1.0 to 10.0 centimeters.

In Schirmer '118, the porous tube (15) diffuses liquid fuel into the chamber (18). As noted in the first paragraph of column 3, "[t]he use of liquid fuel in this combustion apparatus provides for self-regulation of the wall temperature of the flame tube in accordance with the latent heat absorbed in the vaporization process occurring on the inner surface of the primary combustion chamber." Schirmer '118 also states that "the fuel is delivered uniformly onto the

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entire inner surface of the primary combustion chamber.” (see col. 1, line 68 through col. 2, line 1, see also col. 2, lines 70-72). Thus, the apparatus is considered to operate in the same manner as applicant’s apparatus (e.g. as described on pages 6 and 7 of applicant’s specification).

In regard to the limitation that the fuel film is stable, as noted above, Schirmer ‘118 clearly teaches that the fuel film is “provided uniformly to the entire wall of the combustion chamber” (col. 2, lines 70-72). Webster’s II New Riverside University Dictionary (1988) defines “uniform” as “[b]eing without variation or fluctuation.” The examiner therefore considers that the fuel film formed by Schirmer ‘118 is properly to be considered stable as recited in applicant’s claims.

In regard to the limitations relating to the size/dimensions of the combustion chamber, it has been held that limitations relating to the size of the package were not sufficient to patentably distinguish over the prior art. See MPEP § 2144.04(IV)(A). Thus, it would have been obvious to one of ordinary skill in the art at the time of applicant’s invention to have scaled the apparatus of Schirmer ‘118 to applicant’s dimensions since it has been held that limitations relating to the size of the packet were not sufficient to patentably distinguish over the prior art and the apparatus of Schirmer ‘118 operates in the same manner as applicant’s apparatus.

In regard to claim 7, the pores of tube (15) comprise a plurality of orifices.

8. Claims 1-5, 7, 10, 11, 15, 16, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 3,078,672 to Meurer (“Meurer”).

Meurer discloses in the specification and Figures 1-4 an invention in the same field of endeavor as applicant’s invention and substantially as recited in applicant’s claims 1-5, 7, 10, 11,

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15, 16, and 19-21 with the exception of the lateral dimension of the chamber being sub-centimeter, and more particularly in the range of 1.0 to 3.0 millimeters, and the length being in the range of 1.0 to 10.0 centimeters.

The nozzle (3) of Meurer emits liquid fuel into the chamber (1). As noted in the last paragraph of column 2:

“Fuel injection nozzle 3 represents but one of several nozzles which may be used. The fuel emerges through the slit opening 3a and is immediately deposited upon the inner wall of chamber 1 as a solid fuel jet 4 and, without traversing any free path, is immediately spread as a film of fuel 4a on the inner all of chamber 1.”

Thus the apparatus operates in the same manner as applicant's apparatus (e.g. as described on pages 6 and 7 of applicant's specification).

In regard to the limitation that the fuel film is stable, the examiner considers that the thin fuel formed in Meurer is evenly spread on the walls of the combustion chamber by the swirling motion of the air and is properly considered to be stable as recited in applicant's claims.

In regard to claim 3, see column 2, line 8 of Meurer.

In regard to the limitations relating to the size/dimensions of the combustion chamber, it has been held that limitations relating to the size of the package were not sufficient to patentably distinguish over the prior art. See MPEP § 2144.04(IV)(A). Furthermore, Meurer clearly contemplates keeping the size of the combustion chamber to a minimum (see col. 1, lines 15-17). Therefore, it would have been obvious to one of ordinary skill in the art at the time of applicant's invention to have scaled the apparatus of Meurer to applicant's dimensions since it has been held that limitations relating to the size of the packet were not sufficient to patentably distinguish over the prior art and the apparatus of Meurer operates in the same manner as applicant's apparatus and is concerned with overall size minimization.

9. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meurer as applied to claim 7 above, and further in view of U.S. Patent No. 3,955,361 to Schirmer et al. (“Schirmer ‘361”).

Meurer discloses all the limitations of claim 8 and 9 except for the injector oriented tangentially and orthogonally to the major flow within the chamber.

Schirmer ‘361 discloses a fuel/air mixer/combustion chamber in the same field of endeavor as both applicant’s invention and Meurer. Schirmer ‘361 teaches the use of injectors (49) oriented tangentially and orthogonally to the major flow within the chamber to form an annular stratum around the swirling stream of air to effect controlled mixing of the fuel and air (see col. 1, line 57 through col. 2 line 4 and Fig. 7).

Thus, it would have been obvious to one of ordinary skill in the art at the time of applicant’s invention to provide the apparatus of Meurer with the injectors oriented tangentially and orthogonally to the major flow within the chamber as taught by Schirmer ‘361 to form an annular stratum around the swirling stream of air to effect controlled mixing of the fuel and air.

10. Claims 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,604,988 to Rao (“Rao”).

Rao discloses in the specification and Figures 1-14 an invention in the same field of endeavor as applicant’s invention and substantially as recited in applicant’s claims 15 and 17 including forming a liquid film or inert liquid (water) inside line 23 and injecting gaseous fuel (see col. 6, line 47).

In regard to the limitations relating to the size/dimensions of the combustion chamber, it has been held that limitations relating to the size of the package were not sufficient to patentably distinguish over the prior art. See MPEP § 2144.04(IV)(A). Thus, it would have been obvious to one of ordinary skill in the art at the time of applicant's invention to have scaled the apparatus of Rao to applicant's dimensions since it has been held that limitations relating to the size of the packet were not sufficient to patentably distinguish over the prior art and the apparatus of Rao operates in the same manner as applicant's apparatus.

Double Patenting

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. Claims 1-12, 15-17, and 19-21 rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-16 of U.S. Patent No. 6,877,978.

In regard to claims 1-12, while these claims are broader in scope, they are claiming the same invention as that of claims 1-10 of U.S. Patent No. 6,877,978.

In regard to claims 15-17 and 19-21 these claims claim essentially the same invention as claims 11-16 of U.S. Patent No. 6,877,978 but include a recitation that the chamber is sub-centimeter. It has been held that limitations relating to the size of the package were not sufficient to patentably distinguish over the prior art. See MPEP § 2144.04(IV)(A). Accordingly, the claims 15-17 and 19 of this application are not considered to be obvious in view of claims 11-16 of U.S. Patent No. 6,877,978.

Response to Arguments

13. Applicant's arguments filed 12/7/1005 have been fully considered but they are not persuasive.

Applicant maintains the argument that neither Schirmer '118 or Meurer suggest combustors having the recited "sub-centimeter" dimensions. However, the examiner considers that the prior art fuel films of both Schirmer '118 and Meurer would function for the same purpose as applicant's fuel film. Further, the examiner notes that Meurer specifically provides

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that keeping the size of the combustion chamber to a minimum is desirable (see Meurer, col. 1, lines 15-17) and providing the shortest possible combustion time is desirable (see Meurer, col. 1, lines 37-51). Accordingly, the limitation is not considered to patentably distinguish over the prior art.

Applicant argues that the fuel film of Schirmer '118 is not stable. However, as noted above, the examiner considers that the film formed in Schirmer '118 is stable. The examiner notes that Schirmer '118 describes “[c]ombustion apparently is effected at the highly turbulent shear interface of the fuel and air.” However, though the character of the shear interface between the fuel and air is described as turbulent, as noted above, this is not considered to teach away from the uniform/stable film formation of the fuel itself. Further, applicant’s argument that Schirmer '118 is inoperable is not considered persuasive. The declarations filed 3/21/2005 merely conclude that because the interface formed by the air and surface of the fuel film is described as “turbulent” the film would vaporize because of the shear forces presumed by applicant through the prior art’s use of the term “turbulent.” However, the use of the term “turbulent” in Schirmer '118 does not appear to suggest any particular force nor that this force would be so great as to completely eliminate or vaporize the fuel film of Schirmer '118. Accordingly, the examiner does not consider this assertion to meet the preponderance of evidence standard necessary to rebut a presumption of operability. See MPEP 716.07.

Applicant also reasserts the argument that neither Schirmer '118 or Meurer teach that a liquid fuel film that addresses the issues of heat loss or quenching. As noted above, Schirmer '118 and Meurer are each regarded to teach the application of a stable liquid fuel film. The examiner again notes that the fact that applicant has recognized another advantage (i.e.

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quenching) which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. *See Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). The examiner, therefore, maintains that the function of the fuel film in providing heat loss reduction and flame quenching does not patentably distinguish applicant's invention over the prior art.

Applicant maintains the argument that in Rao only heat transfer and no mass transfer occur between the liquid and the core gas flow. However, this assertion clearly conflicts with the plain disclosure of Rao. To this end, Rao clearly states:

“By creating annular misting in the extended contact zone, the rate of any chemical, physical or **mass transfer process between the two flows may be increased.**” (Abstract of Rao) (**emphasis added**).

and,

“Such an extended zone may also usefully be adopted when the invention is to be applied to effecting physical or chemical reactions or **mass transfer between gas and liquid flows.**”(Rao, col. 4, lines 9-13) (**emphasis added**).

Accordingly, applicant's assertion that Rao is not concerned with mass transfer between the liquid and gas flows is not well taken.

Applicant also maintains the argument that that class of devices disclosed in Rao does not include combustors. Yet, Rao clearly discloses that the device is intended to maintain a flame (see at least col. 2, lines 35-37 and col. 3, lines 1-6). Further, applicant's attention, in particular, to Figs. 2 and 3 of Rao and the discussion of these figures appearing in the specification (see at least col. 6, lines 41-47, col. 6, line 65 through col. 7, line 2, col. 5, lines 3-15). The examiner maintains that class of devices disclosed in Rao clearly does include combustors.

Applicant also asserts that the declarations submitted 3/21/2005 provide evidence of long-felt need. However, It states that the claimed subject matter solved a problem that was long

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standing in the art. However, there is no showing that others of ordinary skill in the art were working on the problem and if so, for how long. In addition, there is no evidence that if persons skilled in the art who were presumably working on the problem knew of the teachings of the above cited references, they would still be unable to solve the problem. See MPEP § 716.04. Further, it has been held that although the record may establish evidence of secondary considerations which are indicia of nonobviousness, the record may also establish such a strong case of obviousness that the objective evidence of nonobviousness is not sufficient to outweigh the evidence of obviousness. (see MPEP (citing *Newell Cos. V. Kenney Mfg. Co.*, 864 F.2d 757, 769, 9 USPQ2d 1417, 1427 (Fed. Cir. 1988), *cert. denied*, 493 U.S. 814 (1989); *Richardson-Vicks, Inc. v. The Upjohn Co.* 122 F.3d 1476, 1484, 44 USPQ2d 1181, 1187 (Fed. Cir. 1997)). In this case, as noted in the prior Office action and above, the evidence of nonobviousness provided by applicant is not sufficient to overcome the teachings of prior art, which clearly suggest the application of liquid fuel films in a variety of combustion devices to provide, among other things, combustion stability (e.g. see Shirmer '118, col. 2, lines 8-11).

Applicant's arguments have been carefully considered in conjunction with the declarations filed 3/21/2005 but are not considered persuasive. Accordingly, applicant's claims are not considered to patentably distinguish over the prior art of record.

Conclusion

14. This action is made non-final. A THREE (3) MONTH shortened statutory period for reply has been set. Extensions of time may be available under the provisions of 37 CFR

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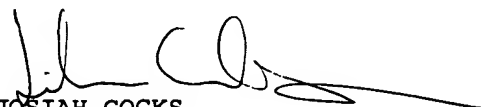
1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Josiah Cocks whose telephone number is (571) 272-4874. The examiner can normally be reached on weekdays from 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ehud Gartenberg, can be reached at (571) 272-4828. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://portal.uspto.gov/external/portal/pair>. Any questions on access to the Private PAIR system should be directed to the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).

jcc
January 23, 2006


JOSIAH COCKS
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ART UNIT 3749